REMARKS

The drawings were objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include reference signs 124, 126 and 112, mentioned in the description and because they include reference sign121, not mentioned in the description. Input124 and output 126 apertures are described in line 16 and 17 of page 8 as, "input 124 and output 126 apertures in the wall 122." The only apertures in the wall 122 are those associated with the input 130 and output 132 legs of the sensor tube 120. The input aperture 124 receives the input leg 130 and the output aperture 126 receives the output leg 132. The examiner correctly posits that the reference #121 is a typo for 112. Revised Figures 1,2,3 and 4, which accompany this response, include appropriately located reference signs 124, 126, and 112. No new matter has been added. not included

The drawings were also objected to under 37 CFR 1.83(a) as not showing the following features specified in the claims: 1) a structure to accelerate the flow of the thermal energy away from the first chamber 2) a thermal ground providing a circular cross-section 3) a thermal ground formed between the valve assembly and the sensor assembly 4) and a thermally conductive element integral to the exterior of the second chamber.

Regarding # 1, "a structure to accelerate the flow of the thermal energy away from the first chamber," the top plan view of Figure 5B illustrates structure to

not figure 5B

accelerate the flow of thermal energy away from the first chamber. Support for such structure may be found, for example, on page 10, lines 10-15 of the description and in claim 6. No new matter has been added by the addition of Figure 5B.

Regarding # 2, "a thermal ground providing a circular cross-section," a thermal ground of circular, rectangular, or other geometrically-shaped cross-sections is described on page 7, lines 10- 15, for example, and a thermal ground having a circular cross section is included in claim 7. New Figures 1B and 1C are top plan views that illustrate the previously described circular and rectangular cross sections of the thermal ground. No new matter has been added by the addition of Figures 1B and 1C.

Regarding #3, "a thermal ground formed between the valve assembly and the sensor assembly," claim 10 has been revised to more clearly set forth the limitation that the thermal ground is formed between the sensor assembly and the mass flow controller housing and thereby forms substantially the entire thermal conductive path between the sensor assembly and the valve assembly. This configuration is depicted in original Figures 1, 3, 4, and 6, and the revised claim addresses this particular objection to the drawings.

Regarding # 4, "a thermally conductive element integral to the exterior of the second chamber. " Support for various configurations of an integral thermal ground in accordance with the principles of the present invention may be found, for example, on page 9, lines 21-24. Figures 1D, 1E, and 1F illustrated thermal grounds that are, respectively, integral to a mass flow controller housing, to one side of a baseplate,

and to another side of a baseplate. No new matter has been added by the addition of Figures 1D, 1E, and 1F.

Claims 1-21 are currently pending in the application. Claims 1-21 have been rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicant regards as the invention. In particular, the examiner refers to the "conductive thermal element" of claim 1 and queries whether it is the heat sink, the thermal clamp or neither. Claim 1 has been amended to clarify the relationship between the first and second chambers and the heat sink that conducts thermal energy from within the first chamber away from the second chamber. Similarly, the rejections of claims 10, 11, 14, and 17 have been addressed in the amended claims.

Claims 1-6, 9-17, and 20 were rejected under 35 U.S.C. 102(b) as being anticipated by Vavra et al (5,279,154).

As described by the applicants' and more clearly set forth in amended claims 1 and 10, the applicants' invention includes a thermal ground that provides a single thermal path that isolates thermal mass flow sensor from thermal gradients in the mass flow sensor housing and thereby substantially eliminates flow measurement errors that might otherwise be created by superimposing the thermal gradient of a mass flow controller housing upon the thermal gradient of a thermal mass flow sensor. The leads 70, 72, and 74 of the '154 patent would have the opposite effect. That is, since the leads make thermal contact with different portions of '154 mass flow controller housing, any thermal gradient established across those points would

very effectively superimposed upon the '154 thermal sensor. Additionally, Vavra et al disclose a base 60 made of plastic, a relatively low thermal conductivity material. Such a base would further exacerbate the effect of externally imposed thermal gradients on a thermal sensor.

Claims 7, 8, 18 and 21 were rejected under 35 U. S. C. 103(a). As noted in the discussion related to the 35 U.S.C. 102(b) rejections, Vavra et al do not disclose a thermal ground that substantially eliminates the conduction of a thermal gradient from a mass flow controller housing to a mass flow sensor. As previously noted, the thermally grounded leads of Vavra, in fact, would heighten the negative effects of a mass flow controller housing's thermal gradient and, therefore, Vavra not only does not disclose or suggest the applicants' thermal ground, Vavra teaches away from the applicants' claimed invention.

Regarding the rejection of claims 8 and 18, the applicants disclose and claim an enclosure that makes conductive thermal contact with the thermally conductive element that is configured to transport waste heat from the mass flow controller and, in particular, from the mass flow controller valve assembly. No such combination is disclosed or suggested by either Vavra or Vu.

Regarding claim 21, for the reasons set forth above, Vavra et al do not disclose the claimed invention except for the thermally conductive element. Consequently, providing the thermally conductive element and the exterior of the second chamber forming an integrally molded unitary member would not constitute forming in one piece an article that has formerly been formed in two pieces and,

therefore, would not meet the requirements of Howard v. Detroit Stove Works.

Accordingly, Applicants have amended claims 1, 6, 10, 14, and 17. Reconsideration and withdrawal of the objections to the Figures and claims are therefore respectfully solicited. Attached hereto is a marked-up version of the changes made to the claims by the current amendment. The attached page is captioned "**Version with markings to show changes made**".

CONCLUSION

On the basis of the foregoing amendments, Applicant respectfully submits that all of the pending claims 1-21 are in condition for allowance. Favorable consideration and allowance of the application are therefore respectfully solicited. If there are any questions regarding these amendments and remarks, the Examiner is invited to contact the undersigned at the telephone number provided below.

Respectfully submitted,

James W. Wiegand
Registration No. 39,423
McDermott, Will & Emery
28 State Street
Boston, MA 02109
(617) 535-4053
Facsimile(617) 535-3800

Date: January 2, 2003

VERSION WITH MARKINGS TO SHOW CHANGES

In the claims:

1. (Amended) A thermal mass flow controller housing, comprising:

a) a first chamber for enclosing a bypass tube, the first chamber including a wall for mounting a second chamber;

b) a second chamber for enclosing a sensor tube, the second chamber including a wall for mounting to said wall of the first chamber, both walls including input and output apertures formed therethrough to provide access to the bypass tube for the sensor tube;

c) a thermal ground formed between the first and second chambers, the thermal ground comprising substantially the entire thermal conductive path between the first and second chambers, the thermal ground positioned to substantially preclude the conduction of a thermal gradient from the first chamber to the second chamber; and

d) a heatsink [conductive thermal element] in conductive thermal contact [conductive] with at least a portion of the first [second] chamber and formed to conduct thermal energy from within the first [second] chamber away from the second [first] chamber.

6. (Amended) A thermal mass flow controller housing according to claim 3, wherein the conductive thermal element includes one or more exterior surfaces that face substantially toward the first chamber and one or more exterior surfaces that face substantially away from the first chamber and one or more of those surfaces that face substantially away from the first chamber includes structure to dissipate [accelerate the flow of] thermal energy away from the first chamber.

10. (Amended) A thermal mass flow controller comprising:

a) a control valve assembly for controlling the rate of fluid flow through a conduit, the control valve assembly in thermally conductive communication with a thermal mass flow controller housing;

b) a sensor assembly for sensing the rate of flow of the fluid through the conduit as a function of the difference in temperature between first and second regions of the conduit and for generating a control signal as a function of said rate of fluid flow, the sensor assembly in thermally conductive communication with said mass flow controller housing;

c) a thermal ground formed between the [valve assembly] mass flow controller housing and the sensor assembly, the thermal ground comprising substantially the entire thermal conductive path between the sensor assembly and the valve assembly the thermal ground positioned to substantially preclude the conduction of a thermal gradient from the mass flow controller housing to the sensor assembly; and

d) a heatsink [conductive thermal element] in conductive thermal contact with at least a portion of the control valve assembly [second chamber] and formed to conduct thermal energy from within the control valve assembly [second chamber] away from the sensor assembly [first chamber].

14. (Amended) A thermal mass flow controller according to claim 13 wherein the mass flow sensor assembly includes a sensor tube having an operational section and the

major axis of the thermal ground is perpendicular to an axis defined by the operational section of the mass flow sensor.

17. (Amended) A thermal mass flow controller according to claim 11, wherein the conductive thermal element includes one or more exterior surfaces that face substantially toward the <u>sensor assembly</u> [first chamber] and one or more exterior surfaces that face substantially away from the <u>sensor assembly</u> [first chamber] and one or more of those surfaces that face substantially away from the <u>sensor assembly</u> [first chamber] includes structure to <u>dissipate</u> [accelerate the flow of] thermal energy away from the <u>sensor assembly</u> [first chamber].